

U.S. DEPARTMENT OF  
**ENERGY**

Office of ENERGY EFFICIENCY  
& RENEWABLE ENERGY

WATER POWER TECHNOLOGIES OFFICE

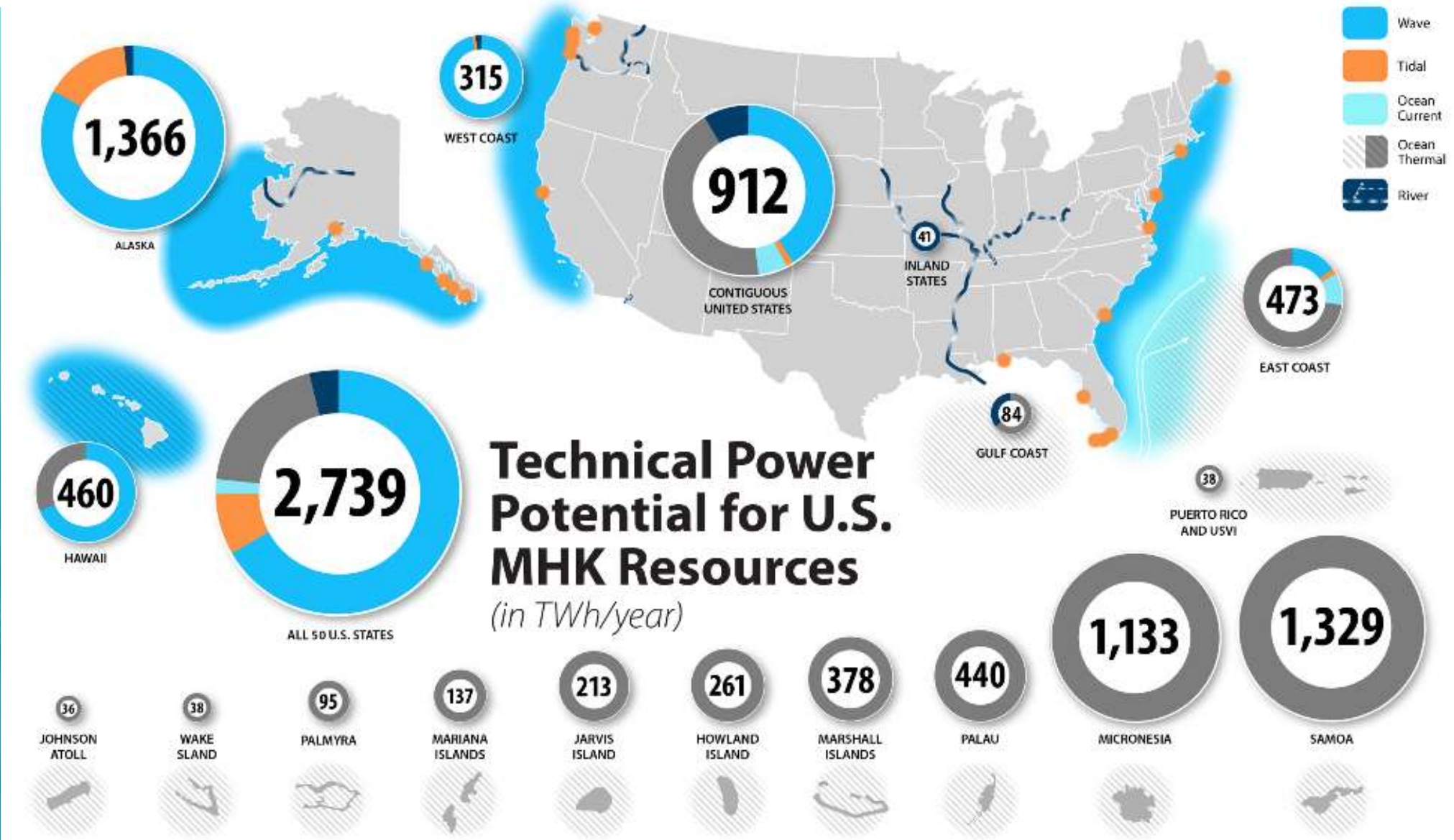
# Marine Energy in the United States

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Pan American Marine Energy Conference 2024 – January 22, 2024

# The Size of the Marine Energy Resource is Significant



# National Goals Alignment for Marine Energy

## 100% Decarbonization of the Grid by 2035

There is a U.S. national goal for decarbonization of the grid by 2035, with all electricity coming from renewable or net-zero carbon solutions.

Marine energy can help achieve that goal, including serving as a baseload power to complement wind and solar.

## 100% Decarbonization U.S. Economy by 2050

As marine energy can be suited for non-grid purposes, like desalination, ocean observation, aquaculture, and other at-sea applications, marine energy can help in achieving national economy-wide decarbonization goals by 2050.

## White House Ocean Climate Action Plan

Released in 2023, the White House has committed to a series of actions that help position the ocean as a climate asset. This included offshore renewable energy development, with marine energy and offshore wind as the primary energy sources in that plan.

# Marine Energy Program Vision and Mission

**VISION:** A U.S. marine energy industry that expands and diversifies the nation's energy portfolio by responsibly delivering power from ocean and river resources.

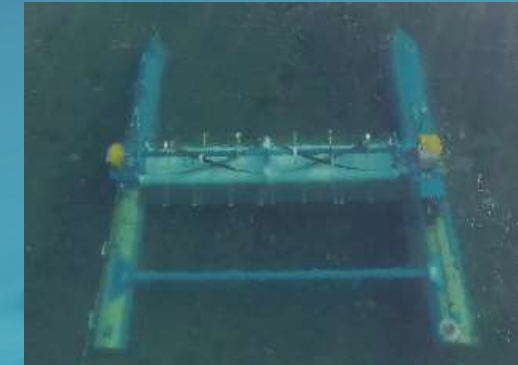
**MISSION:** Conduct research, development, demonstration, and commercial activities that advances reliable, cost-competitive marine energy technologies and reduces barriers to technology deployment.



Waves



Tides



Ocean and River Currents



Ocean Thermal Energy Conversion



Salinity and Pressure Gradients

# WPTO is Interested in Water Power at All Scales



## Watts:

enable a persistent power source to understand the ocean, by powering observing buoys, monitoring for the environment



## Kilowatts:

develop deployable systems to provide clean water, power aquaculture, and powering remote communities



## Megawatts:

deploy and demonstrate water powered systems for local grids, remote communities, powering dams and agriculture



## Gigawatts:

deploy and demonstrate seasonal storage, enhance hydro grid flexibility, demonstrate new water power systems

All scales require technical and financial assistance, testing infrastructure, user-centric designs, and a robust innovation ecosystem.

# Federal R&D and Expanded Incentives in the U.S.

WPTO's Marine Energy Program is currently funded at the high level since its establishment.

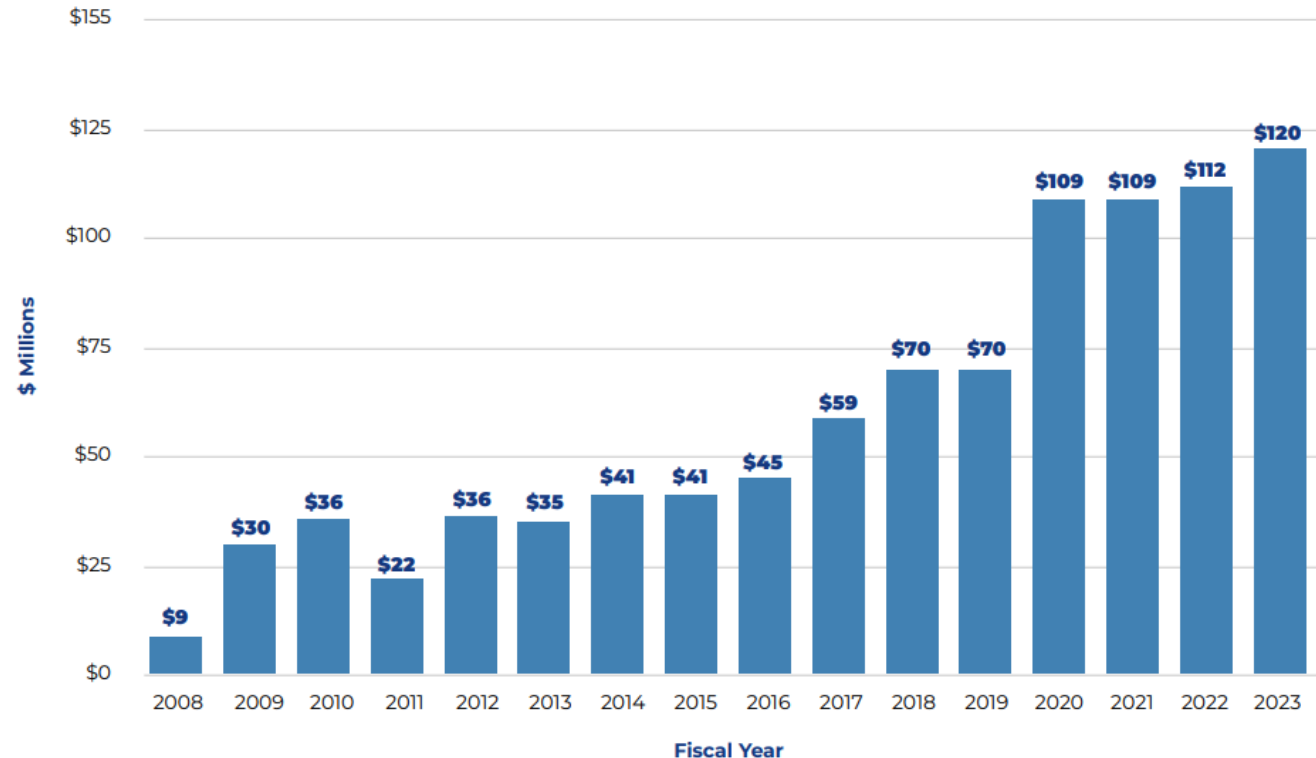
- \$120 million in FY23
- \$110.4 million additionally from the Bipartisan Infrastructure Law

Marine energy is eligible for U.S. tax incentives thanks to the Inflation Reduction Act of 2022:

- the **production tax credit**, which provides credit for electricity produced from certain renewable resources, and
- the **clean energy investment tax credit** which was created for eligible clean energy investments.

Additionally, marine energy projects leveraging an existing conduit are eligible for the **Hydroelectric Production Incentive Program**, which provides \$0.018/kWh for energy projects once operating.

## WPTO Marine Energy Budget Over Time



*Note: This graph shows annual appropriations and enacted funding only. This graph does not reflect the \$110.4 million of funding from the Bipartisan infrastructure Law for WPTO-led marine energy activities.*

# Recent Marine Energy Investments and Announcements – A Few Highlights

**Tidal and Current Energy:** \$45 million for one large-scale demonstration site (topic area closed) and one community-led site. Selections to be announced soon.

**Wave Powered Desalination:** \$10.3 million total in selections for six projects focusing on wave-powered desalination, and a feasibility assessment for an ocean current test facility.

**University-led R&D:** \$14.5 million opportunity open for U.S. universities. **Concept papers due February 20.**

**Distributed Embedded Converters:** \$2.3 million prize to encourage innovation in distributed embedded energy converter technology. **Phase 2 submissions due May 7.**

**Marine Energy to Provide Power at Sea:** \$1.7 million prize to advance technologies that use marine energy to power ocean-based activities. **Phase 1 submissions due July 26.**

Since January 2023, WPTO has released, or co-released with partners, **11 funding and 3 technical assistance opportunities** relevant for marine energy.



*Oneka, the grand prize winner of WPTO's Waves to Water Prize, was selected for two new awards to advance their desalination system.*

# Recent Marine Energy Deployments and Other R&D

Between January 2020 and January 2024, WPTO has

- funded **in-water testing of a dozen devices** across the United States (and three are currently in final prep stages for deployment),
- supported at least **40 small businesses** working in the marine energy sector through the Small Business Innovation Research Program, and
- provided **more than \$13 million worth of technical support across 130 marine energy projects** through the TEAMER program.



*ORPC in Maine*



*Oscilla in Hawaii*



*CalWave in California*



*Triton Systems in Massachusetts*



# New Grid-Connected Wave Test Facility Under Construction

PacWave South facility, in development, recently installed more than 6 miles (about 10 kilometers) of conduits. Once operational, it can support up to 20 devices across 4 berths.

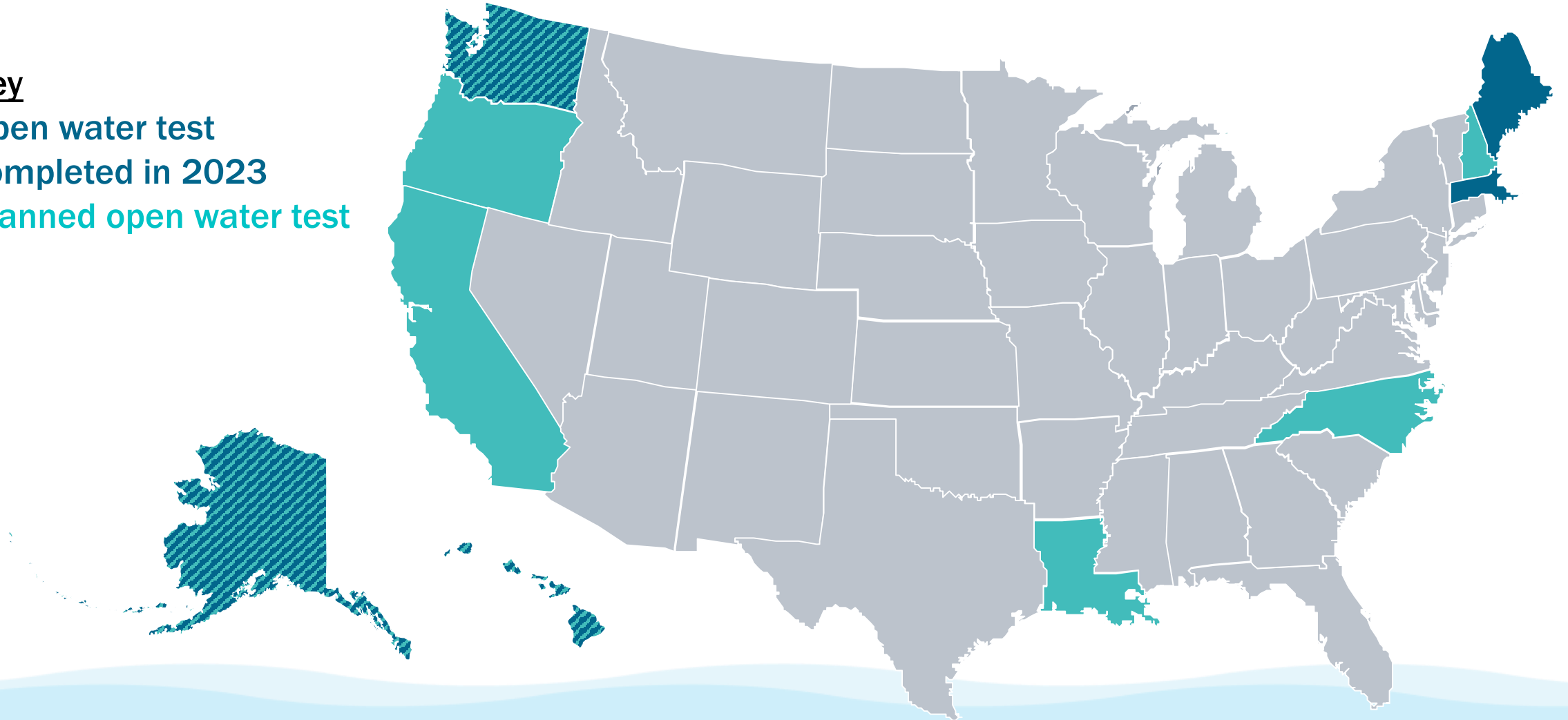


# 2023 Open Water Tests and Planned Deployments

Key

Open water test  
completed in 2023

Planned open water test



# Opportunities for Non-U.S. Groups to Work with WPTO

**International Energy Agency Ocean Energy Systems:** The U.S. is a co-chair and we are actively coordinating with OES countries.

**U.S. Testing Expertise and Access to Marine Energy Research Program (TEAMER):** Non-U.S. organizations can apply into TEAMER for testing access and support (funding goes directly to the chosen U.S. facility).

**International Standards:** Join IEC standards committees to ensure standards compliance for novel marine energy technologies.

**University Marine Energy Research Community (UMERC):** Non-U.S. institutions can join as international liaisons.

**Marine Energy Collegiate Competition:** Non-U.S. universities are welcome to participate but are ineligible for DOE funding.

**Public Funding Opportunities and Prizes:** Non-U.S. organizations can sometimes partner with a project team led by a U.S. organization.



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# Summary of Major IRA Changes

IRC §	IRA §	Short Name	Major Changes by IRA Enactment
25D	13302	<b>Residential Clean Energy Credit</b>	Extended at 30% through 2032. Phases out then expires in 2035. Standalone battery storage now eligible. Biomass heating ineligible.
45	13101	<b>Production Tax Credit (PTC)</b>	\$27.5/MWh credit for specific technologies. Solar and geothermal now eligible. Expires in 2025.
45Y	13701	<b>Clean Electricity PTC</b>	Similar value 45 credit for zero or negative emitting technologies. Phases out when power sector emissions reach 25% of 2022 levels. Begins in 2025.
48	13102	<b>Investment Tax Credit (ITC)</b>	30% credit for specific technologies. Storage, biogas, electrochromic glass, and microgrid controllers now eligible. Added allocated low-income bonus of 10-20 percentage points. Expires in 2025.
48E	13702	<b>Clean Electricity ITC</b>	30% credit for zero or negative emitting technologies. Phases out when power sector emissions reach 25% of 2022 levels. Includes allocated low-income bonus of 10-20 percentage points. Begins in 2025.
<b>Cross-cutting provisions</b>  (These do not apply to 25D. Covered in detail in other cross-cutting working groups)		<b>Wage and Apprenticeship Standards</b>	Projects must meet prevailing wage and apprenticeship requirements for construction, alteration, or repair, otherwise credits are 5x lower
		<b>Energy Community Bonus</b>	Credits are 10% higher for PTC or 10 percentage points higher for ITC if projects are located in an “energy community”
		<b>Domestic Content Bonus</b>	Credits are 10% higher for PTC or 10 percentage points higher if domestic content requirements are met
		<b>Direct Pay and Transferability</b>	Credits are directly paid for non-profits, public power, and government or tribal entities. Otherwise credits are transferable to other taxpayers.

# Other DOE Programs at DOE Relevant to Marine Energy

**Advanced Research Projects Agency-Energy (ARPA-E):** ARPA-E issues periodic funding opportunities for early-stage R&D and has funded several tidal and current energy projects.

**Office of Clean Energy Demonstrations (OCED):** OCED funds demonstration programs that could support marine energy technologies.

**Loan Programs Office (LPO):** LPO offers loan programs to finance energy infrastructure projects across the U.S. Marine energy projects are eligible for DOE loan guarantees.

**Grid Deployment Office (GDO):** Marine energy is eligible for GDO's Hydroelectric Production Incentive Program.

